

## CASE REPORT

### Spinal anaesthesia in a patient with Takayasu's disease

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#### SUMMARY

*We report the successful anaesthetic management of therapeutic abortion under spinal anaesthesia in a 32-yr-old woman with Takayasu's disease. The pathology and pathophysiology of this syndrome and their impact on anaesthesia are discussed. (Br. J. Anaesth. 1994; 72: 129–132)*

#### KEY WORDS

*Anaesthetic techniques: spinal. Complications: Takayasu's disease.*

Takayasu's disease is a rare form of chronic occlusive panarteritis of unknown origin. Clinical symptoms occur as a consequence of progressive obliteration of the lumina of the aorta and its main branches, the pulmonary arteries, or both, resulting in intermittent ischaemic episodes. There are several case reports on the use of general [1–4] and extradural [3, 5–8] anaesthesia in subjects with this disease. We describe the successful anaesthetic management of therapeutic abortion under spinal anaesthesia in one such patient.

#### CASE REPORT

A 32-yr-old gravida 2, para 1 woman of Caucasian origin (weight 65 kg, height 169 cm) was scheduled for therapeutic abortion. Since adolescence, her arterial pressure has been difficult to measure. Five years before, she had undergone uneventful anaesthesia for plastic reduction of her breasts; 3 years later she had delivered a healthy girl after an uneventful pregnancy. Several months later, the patient started to suffer from chronic fatigue and observed vertigo during reclination of her head and pain in both shoulders and the neck. Within a 9-month period, systolic arterial pressure values recorded on both arms declined progressively from 120 to 70 mm Hg. Finally, it was impossible to measure arterial pressure because Korotkoff sounds were no longer audible. Two months before the present operation, paraesthesiae in the right arm occurred during work and were accompanied by Raynaud's phenomenon. A Doppler sonographic study of the extracranial arteries revealed diffuse thickening of the intima and intensive narrowing of both subclavian vessels and the left common carotid artery. Marked stenosis was observed in the right vertebral artery. These findings are consistent with the diagnosis of Takayasu's disease. Further radiographic studies of the arteries were not performed. Transthoracic echocardiography revealed normal

left ventricular contractility (ejection fraction 64%), with no signs of valvular involvement in the inflammatory process. Therapy was started with prednisone 25 mg orally once per day.

Several days before Takayasu's disease was diagnosed, the patient had become pregnant. Although she initially wanted to give birth to her baby, she later decided to have a therapeutic abortion because an angiologist pointed out that there was a remote possibility that her disease might worsen during pregnancy.

Physical examination on admission revealed an alert patient without neurological deficit. Flexibility of the neck was not impaired, but reclination of her head resulted in slight vertigo and a feeling of light-headedness. Heart beat was regular at a rate of 85 beat min<sup>-1</sup>. Cardiac and pulmonary auscultation were normal; marked bruits were present over both subclavian and carotid arteries. The radial pulse of the right arm was weak, while the remaining pulses of the upper limbs and neck were palpable. The pulses of the lower extremities were all palpable. As Korotkoff sounds were inaudible in the arteries of the upper limbs, systolic arterial pressure was measured using a Doppler probe over the radial artery for blood flow detection while a Riva-Rocci cuff was deflated [1]. Values obtained over the right and left radial arteries were 70 mm Hg and 80 mm Hg, respectively. Blood flow was detected at 120 mm Hg in the peripheral arteries of both legs; this value was in agreement with the systolic arterial pressure measured with an automatic arterial pressure device. Diastolic arterial pressure was 75 mm Hg. Chest x-ray and ECG revealed no pathological findings. Erythrocyte sedimentation rate was increased to 26 mm h<sup>-1</sup>.

On the morning of surgery, the patient was premedicated with midazolam 7.5 mg orally 60 min before induction of anaesthesia; this resulted in no detectable degree of sedation. Monitoring, including a two-lead ECG and an automatic arterial pressure device attached to the right thigh, was started. Arterial pressure was 145/90 mm Hg at a heart rate of 90 beat min<sup>-1</sup>. Pulse oximetry was not possible because the probe failed to get a signal from any

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finger or toe, both lobes of the ears or the nose. An i.v. cannula was inserted and Ringer's lactate solution 15 ml kg<sup>-1</sup> infused over 15 min. The patient was then turned to the left lateral decubitus position and dural puncture was performed at the L3–4 interspace using a 24-gauge Sprotte spinal needle. One millilitre of 5% lignocaine in 7.5% glucose was injected into the subarachnoid space. The patient was turned immediately on her back and placed into the lithotomy position. After 5 min, a sensory block to pinprick was obtained at the T10 level. Arterial pressure was measured at intervals of 1 min throughout surgery. It decreased to a minimum value of 115/70 mm Hg 4 min after subarachnoid injection of the local anaesthetic and was corrected by rapid infusion of Ringer's lactate 300 ml and i.v. administration of ephedrine 5 mg. Afterwards, midazolam in increments of 1 mg (total dose 7 mg) was administered i.v. to reduce apprehension and resulted in light sedation, as the patient stayed arousable and co-operative. The surgical procedure, lasting 15 min, was uneventful, as was the further postoperative course in the recovery room. Full recovery from the subarachnoid block was observed 60 min after the operation and the patient had complete amnesia of the surgical procedure.

#### DISCUSSION

Takayasu's disease was first described in 1908 [9] and is a non-specific obstructive arteritis. The disease occurs predominantly in young Asian and Hispanic women in the first three decades of life.

The aorta or its main branches, or both, are the predominant sites of the inflammatory process. The pulmonary arteries are often affected [10], whereas involvement of the coronary arteries and the venous system is unusual [11]. Although atherosclerosis, trauma, syphilis and tuberculosis have been described as aetiological factors [12], the majority of cases are idiopathic and autoimmune phenomena may play a part [13]. The inflammatory changes within the arterial wall result in intermittent ischaemic disturbances of organ function such as vertigo, syncope, convulsions, transient hemiplegia, aphasia, visual disturbances, ischaemic pain and fatigue of the arms. The pathological process may be accompanied by narrowing or occlusion of the lumina of the affected vessels and result in shortening of the carotid arteries, widespread aneurysm formation and thrombus formation [10].

Ishikawa classified Takayasu's disease according to findings at the time of diagnosis. Patients with no complications or one mild complication were classified in groups I and II-a, whereas those with one severe or several mild complications were placed in groups II-b and III, respectively [10]. Because the incidence and severity of complications resulting from the condition correlate with the time elapsed since onset of symptoms and start of therapy, early diagnosis and treatment seem to be crucial for the individual prognosis. In a series of 54 Japanese patients, a 5-yr overall survival rate of 83% has been reported: 30% of all patients in groups II-b and III died despite treatment [10]. Because our patient had

no systemic complications, she was classified in group I, in which mortality was not observed by Ishikawa.

The impact of pregnancy on Takayasu's disease is unclear. Worsening of ischaemic symptoms, deterioration of hypertension, cerebral haemorrhage and cardiac failure have been reported as complications in association with pregnancy [14], but there are several reports on uncomplicated pregnancy and childbirth in patients with the disease [12, 14, 15]. Our patient suffered from a high degree of anxiety and panic disorder with regard to potential complications of her disease during pregnancy. Thus the indication for therapeutic abortion in our patient was based on psychiatric findings rather than on her actual medical condition.

Preoperative assessment of a patient with Takayasu's disease must take into account the distribution of the arteritis and the degree of organ involvement with special attention to cardiac, pulmonary, renal and cerebral function, in addition to the drugs used for treatment of the disease. The influence of changing head position on cerebral function should be evaluated during the preoperative visit, because hyperextension of the neck or incorrect positioning of the head during laryngoscopy and surgery may further compromise blood flow through shortened and obstructed carotid arteries.

Previous reports on the anaesthetic management of patients suffering from Takayasu's disease have emphasized the importance and inherent difficulty of adequate cardiovascular monitoring [1–6, 12, 16, 17]. It may be impossible to measure arterial pressure by classical methods, while a Doppler probe may be effective [1]. However, arterial pressure often varies from site to site and, therefore, may not be a reliable indicator of regional tissue perfusion. In our patient, very reduced systolic arterial pressure readings obtained by a Doppler probe from the upper extremities were slightly different on each side and did not correspond at all to arterial pressure values measured in both legs, which were within the normal range. Therefore, the Doppler probe on the arm was judged to be unreliable for monitoring during surgery and not relevant for estimation of cerebral perfusion pressure. During the preoperative evaluation, the Doppler probe revealed, in both legs, systolic arterial pressure values identical to those obtained by an automatic arterial pressure device. We decided therefore to measure the patient's arterial pressure during surgery with an automatic arterial pressure device applied to the right thigh. Although pulse oximetry has been used to determine systolic arterial pressure in limbs with weak or absent pulses [18], this method failed in our patient. The use of an arterial cannula is controversial because of the theoretical risk that occlusion may be triggered by cannulation of affected arteries. Invasive arterial pressure monitoring was judged unnecessary in our patient because she had normal left ventricular function, and because of the minor nature of the scheduled surgical procedure.

During anaesthesia, hypotension should be avoided because of the risk of regional, and especially cerebral hypoperfusion. Sympathetic block

associated with spinal or extradural anaesthesia may result in potentially harmful hypotension unless acute volume expansion (Ringer's lactate 15–20 ml kg<sup>-1</sup>) is performed 15–30 min before the block. If hypotension (> 20% decrease in systolic arterial pressure compared with baseline) still occurs, it may be corrected by generous i.v. administration of fluids and autotransfusion by placing the patient into the Trendelenburg position. If these measures fail to restore cardiovascular stability, i.v. administration of ephedrine in judicious doses (2.5–5 mg) has been recommended [6], having in mind that vasopressors may worsen ischaemia in affected organs [12].

Maintenance of cerebral perfusion pressure during anaesthesia is of crucial importance in Takayasu's disease. During general anaesthesia, intraoperative EEG monitoring has been used to detect cerebral ischaemia [16], but there have been several case reports of uncomplicated neurological outcome in which general anaesthesia has been used without EEG monitoring [1–3]. Nevertheless, one patient has recently been reported, in whom cerebral infarction was documented after general anaesthesia for reconstructive plastic surgery [4]. As an awake patient is still the most simple and reliable monitor of an adequate cerebral perfusion, regional anaesthesia was judged to offer considerable advantages over general anaesthesia for the present short surgical procedure.

The use of a paracervical block combined with i.v. sedation and analgesia using midazolam and alfentanil has recently been described for the anaesthetic management of therapeutic abortion in Takayasu's disease [17]. In our institution, surgeons do not regularly perform paracervical block and, therefore, adequate expertise in this local anaesthesia technique is lacking. However, the success rate of a paracervical block depends not only on the skill of the administrator, but also upon the number of sensory fibres that leave the uterus via the ovarian plexuses and thus remain unaffected by the local anaesthetic solution [19].

Spinal anaesthesia provides profound anaesthesia which also includes the sacral nerve roots supplying the perineal region. In contrast, in lumbar extradural anaesthesia, efficient block of the thick sacral nerve roots is often achieved only after administration of a rather large volume of local anaesthetic solution [20], the rostral spread of which is much less controllable than that of a hyperbaric spinal anaesthetic. As a consequence, the theoretical advantage of slower onset of sympathetic block under lumbar extradural anaesthesia may be offset by an increased extent of sympathetic block that may affect haemodynamic stability. Therefore, we decided to perform spinal anaesthesia with a small volume of local anaesthetic, limiting the upper level of sensory block by patient positioning. With a dermatomal sensory level at T10, complete anaesthesia for the cervix (T10–L1) and the perineal region (S2–5) was achieved. The cardiovascular consequences were only minor, readily correctable and did not result in any signs of cerebral ischaemia.

Caudal extradural anaesthesia might have been a valuable alternative to our approach. Insertion of a

catheter would have allowed titration of the drug and would have offered the advantage of a more gradual onset of sympathetic block than with spinal anaesthesia. However, experience with catheter caudal anaesthesia in adult patients is limited in our institution and use of the technique may have increased the risk of block failure.

There are only five case reports in the literature on the administration of a central neural block in Takayasu's disease. In all the patients, an extradural block was performed. In three, lumbar extradural anaesthesia was used to provide analgesia during labour and delivery [5–7] and in one of these patients it was used also for subsequent postpartal tubal ligation [6]. Lumbar extradural anaesthesia was used in another patient for Caesarean section [8], while thoracic extradural anaesthesia was implemented in the remaining patient, for postoperative pain control after kidney transplantation under general anaesthesia [3]. For monitoring of arterial pressure, an automatic arterial pressure device was used in two patients in whom it was attached either to one thigh [7] or to both arms and one thigh [20]. In three patients, cannulation of the femoral [5, 6] or ulnar [3] artery was performed to allow continuous monitoring of arterial pressure.

In only one of those five patients was CVP measured as an index of right ventricular preload during labour and delivery [5]; PCWP was measured in another parturient [6] and in a patient with renal transplantation [3] to control left ventricular loading. Neither CVP nor PCWP were measured in the patient who underwent Caesarean section [8]. As surgery for therapeutic abortion is not accompanied by significant changes in blood volume, measurement of CVP and PCWP were not considered necessary in our patient, who had excellent cardiac pump function.

In conclusion, the anaesthetic management of a central neural block in Takayasu's disease is controversial. To our knowledge, this is the first report which describes the successful administration of spinal anaesthesia to a patient with the condition. Although extradural and general anaesthesia have been used for various surgical procedures with good results, spinal anaesthesia may be a useful alternative.

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